The Sacred and the Modern: The History, Conservation, and Science of the Madina *Sitara*

This article examines the history and conservation and offers a scientific analysis of a *sitara* given to The Metropolitan Museum of Art in 2009. This *sitara*, one of only a small number known from published sources, is a late nineteenth-century Ottoman curtain that hung on the Bab al-Tawba (Door of Repentance) inside the Ka’ba in Mecca. Historical analysis situates this rare object within a centuries-old tradition of textile production for the most sacred sites in Islam. Examination of the yarns, dyes, weaving and embroidery techniques, metal wire thread, and other materials and processes that went into the production of this sacred and symbolic curtain presents it in the context of its manufacture in the globalized world of the late nineteenth century.

**HISTORY**

Textiles produced for the Ka’ba in Mecca, Islam’s holiest site, represent the most sacred and iconic objects in...
Islamic art. In 2009, Maan Z. Madina, professor emeritus in the Department of Middle Eastern, South Asian, and African Studies at Columbia University, New York, gave the Metropolitan Museum one of these, an interior curtain (sitra) that hung on the Bab al-Tawba (fig. 1).1

While the textiles that draped the exterior of the Ka’ba are well represented in museums and private collections,2 Bab al-Tawba sitaras have generally been less known to the larger community of art historians, having appeared in public or private art collections only recently. The production of sacred textiles for the Ka’ba has a long history that dates back to the earliest years of Islam, and the custom of draping the exterior walls and interior spaces with these textiles is well established in the historical record. Responsibility for commissioning the Ka’ba textiles and transporting them to Mecca generally fell to the ruler who held sovereignty over the holy cities. The Ottoman sultans were the longest serving of these rulers, having conquered Egypt, Mecca, and Medina in 1517. As rulers of Mecca and Medina, they thus acquired the title Khadim al-Haramayn al-Sharifayn (Custodian of the Two Noble Sanctuaries) and in this capacity held the privilege of ordering replacement of these textiles, an honor that continued until the end of the Ottoman dynasty in 1923. Throughout these centuries, the covering that draped the exterior walls of the Ka’ba (kiswa), the belt around the Ka’ba embroidered with Qur'anic inscriptions (hizam), and the curtain covering the door into the Ka’ba (burqu’) were seen by millions of pilgrims who performed the hajj.3 Textiles hanging inside the Ka’ba, however, were seen only by the few dignitaries and special guests who were privileged to enter, or pilgrims who were present when the doors were opened for prayer. The Bab al-Tawba is the door to the stairway up to a mezzanine where the Prophet Muhammad is believed to have ordered the destruction of pagan idols as a ritual of repentance. This site later became a repository for

fig. 2 The four uppermost cartouches of the sitara in fig. 1 embroidered with the basmala and with Qur’anic Ayat 54 of Sura VI
When those come to thee who believe in Our signs, Say: “Peace be on you. Your Lord hath inscribed for Himself (the rule of) Mercy: verily, if any of you did evil in ignorance, and thereafter repented, and amended (his conduct), lo! He is Oft-forgiving, Most Merciful.”

The connection between this verse and the Door of Repentance is clear: God will grant forgiveness and mercy to those believers who commit sins but repent with humility and without arrogance.

The inscription was a form of memorialization that symbolized the ruler’s religious and political authority. The inscription in the lower three cartouches (fig. 4) designated Ḥabīb Hilmi Pasha, governor, or khedive, of Egypt from 1892 to 1914, with the honor of overseeing the production and transportation of the sitara and asked for God’s victory or glory, a tradition thought to bring blessings and good omens.

Our great Master, our Effendi, Ḥabīb Hilmi Pasha, Khedive of Egypt, the [divinely] protected, son of the late Muhammad Tawfiq Pasha, renewed this noble curtain; Lord make glory permanent with him.

The reign of this sultan and the rule of his governor overlapped, thereby narrowing the date of manufacture of the Madina sitara to the seventeen-year period.
The three cartouches in the lower half of the sitara in fig. 1, embroidered with the name ‘Abbas Hilmi Pasha, the governor of Egypt who oversaw production of the textile at the Warshat al-Khurunfish in Cairo and its transportation during the hajj.
between 1892, when 'Abbas Hilmi came to power in Egypt, and 1909, the end of 'Abd al-Hamid’s rule as sultan. However, we can suggest a more precise date of production, for during conservation of the sitara, a piece of paper was discovered sewn among the layers of the curtain (fig. 5a). The paper is degraded and largely unreadable except for سنة ٥١٣ (A.H. 1315/1897–98). The inscription on the sitara also honors the Khedive’s father, “the late Muhammad Tawfiq Pasha” (d. 1892). ‘Abbas Hilmi Pasha was perhaps mourning his father’s recent death and memorializing him in this inscription. But the same dedication appears on the sitara in the Topkapı Palace Museum, Istanbul, which is dated A.H. 1325/1907–8, thus late in ‘Abbas Hilmi Pasha’s governorship.9 It seems that his custom of inscribing his late father’s name was a practice he followed throughout his time in office, one by which he sought to bring blessings associated with the sacred space to his father. The convention of naming deceased rulers was not ‘Abbas Hilmi Pasha’s innovation, for the tradition of such dedications appears as early as the beginning of the eighteenth century on sacred textiles like the tomb covers for the Prophet Ibrahim and for the Prophet Muhammad in Medina. The tradition also appears on other Ka’ba textiles during the period of Sultan Abd al-Hamid II.10

Recent scholarship has suggested that the Bab al-Tawba’s sitaras were replaced only upon the succession of a new sultan.11 However, a comparative examination of some of the complete sitaras made anew during the reign of Sultan ‘Abd al-Hamid II and the governorship of ‘Abbas Hilmi Pasha shows that they were replaced more frequently. In addition to the Madina sitara, there is a sitara in the Nasser D. Khalili Collection of Islamic Art, dated A.H. 1311/1893–94, and one in the Topkapı Palace Museum, dated A.H. 1325/1907–8, as well as two other sitaras recently seen at auction, one that was manufactured between 1892 and 1909, and the other inscribed with the year of A.H. 1321/1903–4.12 This frequency of renewal suggests that this interior textile was replaced every few years as needed.

The sitaras that are alike are composed of a central rectangle containing the cartouches, the lower ones surrounded by floral embroidery. The border around the rectangle contains rosettes interspersed with an arabesque design (see fig. 1). The stylistic and textual exception is the late-Ottoman sitara dated A.H. 1321/1903–4 that was auctioned at Sotheby’s London in 2007 (fig. 6). It is inscribed with the underlying message of God’s forgiveness and mercy in the upper rectangular cartouche embroidered with a portion of Qur’anic Ayat 25 of Sura XLII (al-Shura), “He is the One that accepts repentance from His Servants.”13 The main cartouche contains Qur’anic Ayat 255 (Verse of the Throne) of Sura II.14 This verse is one of the Qur’an’s most beloved
succeeded to rulership in the Shi’ite tradition. This convention is unique to this particular Bab al-Tawba sitara, for while the names of the Prophet Muhammad’s grandsons do appear on his tomb covers in Medina, suggesting the close familial connection between Muhammad and his grandsons, their inscription on this sitara breaks from the tradition in the small number of known Bab al-Tawba sitaras that memorialize only sultans and khe­dives. In this case, the inclusion of the grandsons of the Prophet would remind the community (and particularly those dignitaries and believers who were privileged to enter the Ka’ba) of the sense of union in the pilgrimage and that in the most sacred sites of Islam unity of the community superseded sectarian Sunni­Shi’i divisions.

The Madina sitara and those discussed here were preserved intact, unlike the exterior kiswa. The hangings on the exterior wall of the Ka’ba were commonly cut up and distributed when they were removed, a practice that was based on a hadith (tradition) from the Prophet Muhammad’s wife ‘A’isha’, who said, “Sell those covers and spend the money you earn for the poor and the travelers who are on their way to Allah.” Many of the textiles were returned to Istanbul to become holy relics in the imperial treasury, or they were repurposed as wall hangings or tomb covers for Ottoman royalty in their mausolea. That the known Bab al-Tawba sitaras were left whole suggests that after their replacement their special baraka necessitated that they be given to dignitaries or followed the path of other textiles into the royal treasury or into use as tomb covers.

The high quality of workmanship in the Madina sitara illustrated what was expected in such a sacred textile. In the 1860s, when seeing the Ka’ba textiles, the Ottoman historian Mustafa Naima was awestruck by the “majestic beauty” of the gold and silver embroi­dery. Yet the Madina sitara, even though it hung in an interior space, was also sufficiently robustly made to have withstood long periods on view (see “Conservation, Materials, and Techniques” below). For most of the nineteenth century, textiles for the hajj were manufactured in Cairo at the Warshat al-Khurunfish (Khurunfish Workshop), established by the Ottoman governor Muhammad ‘Ali in 1817. This was, in fact, a complex of workshops that brought together European craftsmen and Egyptian trainees, and the machinery necessary for the production and embellishment of textiles. In addition to machinery, the men made tools for ironworking such as anvils and lathes, and added spinning wheels for producing silk thread and looms for weaving silk and cotton fabrics. There were facilities for dyeing, as well as studios for transfer-
ring patterns to the fabric and for embroidery. In these
studios, craftsmen cut, sewed, lined, and tightly
stretched the background cloth on tension tables. They
then transferred the designs to the cloth by pouncing
and finally executed the labor-intensive and skillful
embroidery (figs. 7, 8).  

Textile workshops throughout the Ottoman Empire,
like the Warshat al-Khurunfish, were affected by the
influx of European imports and the introduction of
modern techniques and materials. The conventional
view has long held that the decline of the Ottoman tex-
tile industry was a chronic condition that led to massive
unemployment and impoverishment over the course of
the nineteenth century. During the flood of European
products from the 1820s through the 1850s, many
Ottoman industries did indeed decline. Even work-
shops like the Warshat al-Khurunfish, with its highly
specialized production of sacred textiles, retrenched
during this period. About 1880, 'Ali Pasha Mubarak, an
Ottoman-Egyptian reformer and modernizer, wrote
that although the workshop was still functioning it had
fallen into disrepair and was making only the kiswa.  
The Warshat al-Khurunfish, however, withstood these
challenges, was restructured, recovered, and, like other
textile industries, managed to regain its position by the
late nineteenth century. Success depended on a number
of factors including the adaptation of textile workshops
to new materials and technologies coming from
Europe. Not all materials were necessarily imported
from Europe, however, for although artificial dyes were
developed in England and Germany in the 1850s and
1860s, they did not displace the Ottoman dyestuff
industry. That industry transformed from a labor-
intensive operation, dependent on gathering and pre-
paring vegetable dyes and subject to the vagaries of

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**fig. 7** Full-size design for a curtain for a door inside the Ka’ba, painted on paper. Nasser D. Khalili Collection of Islamic Art (MSS 1128.8). Areas to be embroidered in gold are colored yellow and those to be embroidered in silver are blue.

**fig. 8** Photograph of Hajj Muhammad Hasan Amin Nada, veteran craftsman at the Warshat al-Khurunfish, Cairo, ca. 1900. In his right hand he holds a spool of metal-wire thread; with his left hand, under the panel he is embroidering, he brings the needle up through the fabric and then back down to couch the metal thread. Nasser D. Khalili Collection of Islamic Art
From 1880 onward the Ottomans more easily adapted to the demands of the world economy and the silk industry expanded with new mills opening in Bursa, Edirne, and Lebanon.

The Warshat al-Khurunfish was part of this late nineteenth-century expansion, with its capacity for spinning, dyeing, and weaving, including special looms for weaving silk cloth. Over the course of the nineteenth century, this process of expansion was uneven, but ultimately workshops such as the Warshat al-Khurunfish were able to continue a long-standing tradition of sacred textile production within the late-Ottoman globalized world.

**CONSERVATION, MATERIALS, AND TECHNIQUES**

The Madina sitara is a black silk curtain appliquéd with pink and green silk/cotton cartouches that contain Arabic calligraphy (see figs. 1–4). It is further embellished throughout with arabesques and scrolling vines. Text, arabesques, and scrolling vines are embroidered in silver and silver-gilt metal wire thread (see fig. 9a). Sequins adorn the centers of the large rosettes around the border of the sitara (fig. 10). The metal-thread embroidery was executed skillfully and meticulously over padding to create a raised effect that was achieved by laying down layers of linen thread over which metal wire was applied by couching. Beneath the areas embroidered with silver-gilt wire thread, orange-colored linen padding thread was used; for the silver areas, white linen padding thread was used. Padding
The metal thread was couched with silk thread, orange for the silver-gilt wire and white for the silver wire. On the back, the couching appears in herringbone stitch, but on the front the metal thread is held in place at the edges of the motif with double back stitches (fig. 9a). This stitch was used because of its strength and stability, as seen on the reverse where interlacing silk threads support the metal wires (fig. 9b).

The **sitara**, which weighs about 25 pounds, is composed of four layers of fabric (described here from the front toward the back), needed to support the heavy metal wire. The embroidery was executed through the black silk background fabric and a layer of white cotton muslin. The next layer is an additional lining of white cotton fabric coated with white pigment on the outer side, attached to the back with webbing around the edges. The final layer, the back of the **sitara**, is a green fabric, a color that was traditionally used to line **sitaras**. That this same fabric was also used for the green touches confirms that the green lining is original to the Madina **sitara**, not a later addition. The curtain was designed to be hung on the Bab al-Tawba inside the Ka’ba by five loops: three along the top and two at the bottom corners.

When acquired by the Metropolitan Museum in 2009, the **sitara** was in fragile condition, which has prevented its display. Though it was strong structurally because of its multilayered composition, its decoration, both the metal-thread embroidery and the appliquéd cartouches, was damaged and weakened, requiring considerable conservation. Textiles made of precious silk fabric with valuable metal-thread embroidery were usually made for religious purposes and for royalty and have therefore been better preserved. Nevertheless threads are clearly visible on the front of the **sitara** in areas where there is loss of metal thread. On the reverse of the embroidery, there is visual evidence that the bundles of padding threads were carried over from one motif to the next, a clear footprint of the original workmanship (see fig. 11). This also indicates that the padding threads penetrated the ground fabric from obverse to reverse and vice versa. In contrast, the metal wire was simply couched to the surface of the background fabric, not carried to the back where it would be unseen and thus wasted. Precious-metal wire was costly and by this method a significantly smaller amount of it was used. Metal embroidery was often raised this way because it better reflects light, adding a vibrant shimmer to the surface of the panel. This would have been even more dramatic and opulent when the **sitara** was first produced, at the end of the nineteenth century, before oxidation and corrosion marred the original sheen of the wire.
Treating these fabrics, a priority, involved stabilizing the weft thread floats using conservation couching stitches (fig. 12a, b). The types of dyes on the cartouche fabrics, discussed in “Analysis of Metal Wires and Dyes” below, will help interpret the origin of these fabrics and contribute to our understanding of their deteriorated condition.

The initial stage of the conservation treatment was to separate the layers of fabric making up the sitara. The white cotton lining covered in white pigment features a round blue trademark stamp reading “Standish Mayflower Bleach” (see fig. 13). Standish, a town in Lancashire, northwest England, was home to Standish Bleach Works, an industrial mill complex that operated from 1886 until 1998. The presence of this stamp reinforces the date the sitara was produced, 1897–98, and the fact that the Cairo workshop imported this lining for the sitara from England, illustrating an example of trade relations between the Cairo workshop and England in the late nineteenth century.

During the close inspection and treatment of an object, exciting and unexpected discoveries are often made. Such was the case when a piece of paper annotated in ink, described in “History” above, was found attached to the bottom edge of the sitara between the black silk background fabric and its muslin lining (fig. 5a). One area of the note, on which is written سنة ٥١٣ (A.H. 1315/1897–98), was exposed, analyzed, and conserved; the rest of the paper is inaccessible and may contain more writing. An X-radiograph of the area shows a shadow of the full note and its location (fig. 5b). Unfortunately this technique did not show writing, probably because the ink used was carbon based rather than metal based, the latter more likely to be visible using X-ray. Reflected infrared photography was experimented with in an attempt to read the concealed...
was taken from an area of embroidery hidden among the layers of padding threads. A single lacquered metal sequin was collected from the center of one of the large rosettes around the border. The wires and the sequin were first examined under a stereomicroscope, later mounted on carbon stubs and analyzed by scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS). Fragments of the silver-gilt wires, the silver wire, and the sequin were also embedded in epoxy resin, cross sectioned, and investigated by SEM coupled with energy and dispersive X-ray spectroscopy (EDS-WDS) and electron backscattered diffraction analysis (EBSD).

The wires all show clear signs of the drawing process used in their manufacture in the form of continuous parallel marks along the length of the wire (figs. 14, 15a). Die marks occasionally scratched the gilding of the silver-gilt wire and exposed the metal beneath (fig. 14a), which indicates that the wire was drawn after the gold was applied, most likely to a preliminary silver rod of a diameter larger than the final product.

In cross section, the four wires that were tested appear very similar in diameter and shape (fig. 14). They all have an approximately circular section and a diameter of 230–240 micrometers. This size is very similar to British Standard Wire Gauge (SWG) number 34 of 0.0092 inch; the Standard Wire Gauge is a legal standard introduced in Great Britain in 1883.
The gilding thickness of each wire is extremely variable, from approximately 500 nanometers to 5.3 micrometers. There is no clear evidence of the gilding technique that was used, but the absence of elements other than gold and silver, the interdiffusion of gold and the underlying silver, and the considerable gilding thickness might indicate that a gold foil or leaf was attached to the silver rod, possibly by heating. Close observation of the wire surfaces in cross section reveals the presence of abundant metal fragments (fines) resulting from a combination of abrasive and adhesive wear, which are limited to the sides of the wire with thinner gilding (fig. 16). These deformed metal flakes are both silver and silver-gilt, supporting the fact that the wires were drawn after gilding.

The wires and the sequin are all made of fine silver alloy, containing trace amounts of copper and lead. Similar drawn silver-gilt wires with slightly higher copper content (up to 1% in weight) and variable sizes have been identified in five sixteenth- to nineteenth-century embroidered Ka’ba curtains in the Topkapi Palace Museum. The slightly different composition and characteristic inclusions of the Madina sitara’s wires suggest that they were created from at least three different batches of silver of high purity.

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An EBSD orientation map of a longitudinal cross section of the wire shows equi-axed grains and no preferred crystallographic orientation (fig. 17), a microstructure consistent with a final annealing treatment applied after the wire was drawn. Annealing of silver wire was commonly done multiple times at intermediate stages of the manufacture, and was necessary to restore the ductility of the metal to be drawn and to reduce the brittleness of the final product.

The sequin, measuring about 4.9 millimeters in diameter, was punched from a sheet of almost pure silver, and the central hole, about 0.8 millimeter in diameter, was pierced at the same time. Before punching, the silver sheet was coated with an organic colored layer, as testified by the circular mark on the red layer of the pierced metal (fig. 18). Fourier transform infrared micro-spectroscopy (FTIR) of the sequin substrate identified proteinaceous matter consistent with the use of gelatin, which was stained in red with eosin, as identified by EDS and HPLC (high performance liquid chromatography) analysis. SEM investigation shows how corrosion products, consisting of silver chloride and sulfide crystals up to a few microns in size, are
the wires suggests that they were drawn according to the British standard introduced at the end of the nineteenth century. The millesimal fineness of the *sitara*’s silver wires (close to 999) is particularly high when compared with other standard productions of the time and is consistent with the values documented in the archival record of the Warshat al-Khurunfish. This last result suggests that the wires were produced in the Cairene workshop.

Dyes used on the various yarns and the colorant used on the red sequins of the *sitara* were analyzed by high performance liquid chromatography–photodiode array detection (HPLC–PDA). The summary of this analysis is found in the table in the Appendix. Those dyes are primarily early synthetic organic dyes, developed in the second half of the nineteenth century. More than one type of dye was used on several of the yarns. Indigo, a main colorant of indigo dye, was detected on the black background fabric. Whether the indigo was from a plant source or was synthesized has not been determined. Synthetic indigo was available on a commercial scale from 1897 from a German chemical company, BASF. Therefore, based on the date of the *sitara*, 1897–98, the indigo used on the background fabric could be either synthetic or natural indigo. The same types of dyes were used on both the warps and the wefts of each appliquéd cartouche, with an additional dye that was used only on the warps (see the table in the Appendix). The extra dye for the warps of the pink cartouche tested, eosin Y, and for the warps of the green cartouche tested, diamond green B, may have been added because of the weaving structure of the cartouches, in which the warps are more visible than the concealed wefts (see “Conservation, Materials, and Techniques” above). That the same types of dyes were found in the warps and wefts of each cartouche and that the extra dyes were added to the more visible warps may suggest that the choice of dyes was deliberate and was part of the dyeing process used on the *sitara*. This may indicate that dyeing of yarns for the *sitara* was planned as a part of the production process.

Ellagic acid was detected on both the silk warps and the cotton wefts of the cartouches, but not on the other yarns. Ellagic acid is derived from hydrolysable tannins found in various plants, so plant extracts containing hydrolysable tannins were likely to have been used on the yarns along with the early synthetic dyes.

The tannins on the silk warps were probably used for weighting, as well as to improve the strength and the drape of the silk. Since the Middle Ages, perhaps even earlier, tannin has been considered an agent used...
The scientific analysis of metals and dyes used in its production are consistent with scholarship on the late nineteenth-century economic history of the Ottoman Empire, where textile workshops were forced to reorganize after the onslaught of European imports, and to update their production methods with the latest materials and techniques. The artisans in the Warshat al-Khurunfish in Cairo, which specialized in producing textiles for the Ka’ba, utilized machinery and materials borrowed from or influenced by up-to-date manufacturing techniques. The choice of materials that went into the Madina sitara demonstrates the importance of the international market in the production of this sacred object: the precious-metal wires were drawn according to current technology, using high-purity silver alloy, while the yarns woven into fabrics were colored using the latest innovative synthetic organic dyes. Conservation was aided by the scientific analysis that revealed deterioration of the fabric elements and embroidery threads in relation to their proximity to the corroded silver wire. The colors of the pink and green cartouches had faded because of the inherently unstable nature of early synthetic organic dyes. The background fabric, dyed with the naturally more stable indigo, remained closer to its originally vibrant color. The discovery during conservation of the dated note sewn among layers of the sitara was serendipitous, and more comprehensive analysis of the note is planned. Further, discovering the trademark stamp on one of the linings established a direct connection between the Cairo workshop and an industrial bleach mill in northwest England, a relationship based on the cotton trade between Egypt and England that has long been recognized in the historical record. The Metropolitan Museum’s sitara is thus representative of late nineteenth-century global interactions involved in its production as well as an object that illustrates the extraordinary work of artisans carrying on a centuries-long tradition of embroidering inscriptions in precious-metal wire thread that convey the themes and messages most sacred to the religion of Islam.

CONCLUSION
This analysis of the Madina sitara, which once hung on the Bab al-Tawba (Door of Repentance) inside the Ka’ba in Mecca, examines it as an object of centuries-old religious symbolism and political memorialization as well as an object of material culture in the globalized world of the late nineteenth century. The information gathered during the sitara’s conservation and the

59 Tannin-containing plants used for tanning fibers include gall nuts, sumac, and myrobalans. Weighting using metal salts instead of tannins, in particular weighting with tin, began at the end of the nineteenth century, although it was soon found that tin-weighted silk would rapidly deteriorate. Other mineral salts for weighting, such as lead acetate and zinc, were also used but to a lesser extent.

60 Elements of warps and wefts from the sitara were analyzed by SEM-EDS. However, tin, the most used metal for weighting silk, was not detected on the silk warps. In addition, the use of other, lesser used metal elements known as weighting agents at that time appears to be unlikely, suggesting that the silk was probably weighted with tannins alone. In terms of tannins that were found on cotton wefts, they were probably used as mordant in order to fix dyes. It is known that a tannin mordant was applied to cotton prior to its dyeing with basic dyes, the same ones that were used on the cotton wefts.

61 Qualities of lightfastness and wash fastness of most early synthetic dyes are known to be poor, in particular those basic dyes that were used on the cartouches, although the fastness depends on the individual or class of dye, depth of shade, and substrates. Indigo dye, used on the black background fabric, is known to be relatively fast to both light and washing. The cartouches’ current shades of pink, green, and yellow are most likely the colors that have faded to some extent.

62 Dyes used on the sitara appear to reflect the period when early synthetic organic dyes had become more popular than natural dyes because of their bright color, ease of application, and low cost. Those early synthetic dyes were discovered in England and Germany in the mid-nineteenth century and then mass-produced and exported to the rest of the world, indicating the influence of the globalized dye market on the sitara. However, the silks seem to have been weighted with tannins alone, a rather traditional technique, at a time when most European silks were weighted with tin salts.
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High-performance liquid chromatography–photodiode array detection (HPLC–PDA) analysis of dyes on some fabrics and threads used in making the Madina sitara

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<th>Colour Index (C.I.) Generic Name of the Dye and Its Year of Discovery</th>
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<td>Warp</td>
<td>Pink</td>
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<td></td>
<td>A small amount of natural yellow dye (flavonoid dye)</td>
<td></td>
</tr>
<tr>
<td>Padding under the metal-thread embroidery</td>
<td>Orange</td>
<td>Bast fibers</td>
<td>Orange II</td>
<td>C.I. Acid Orange 7, 1876-</td>
</tr>
<tr>
<td>Sewing thread</td>
<td>Orange</td>
<td>Silk</td>
<td>Orange II</td>
<td>C.I. Acid Orange 7, 1876-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Metanil yellow</td>
<td>C.I. Acid Yellow 36, 1879-</td>
</tr>
<tr>
<td>Background fabric</td>
<td>Black</td>
<td>Silk</td>
<td>Indigo</td>
<td></td>
</tr>
<tr>
<td>Sequin</td>
<td>Red</td>
<td></td>
<td>Eosin Y</td>
<td>C.I. Acid Red 87, 1871-</td>
</tr>
</tbody>
</table>
NOTES

1 Professor Madina was a well-known collector and benefactor. At a Sotheby’s auction in New York in 1988, he acquired a textile identified in the catalogue (lot 284) as a late eighteenth- to early nineteenth-century Mughal tomb covering. Knowing that it was misidentified, he assigned one of his graduate students, this author, to identify the textile, and she discovered that it was a sitara that had hung on the Bab al-Tawba. Professor Madina later donated the sitara to the Metropolitan Museum in memory of his mother, Najiyah Khanum al-Kurdi.

2 See, for example, İpek 2011.

3 The hajj is one of the Five Pillars of Islam. It is obligatory for all Muslims to make the pilgrimage to Mecca at least once in their lifetime, if they are able to physically and financially.


5 This earliest-known confirmed extant Bab al-Tawba sitara is in the Khalili Collection described below; see Porter 2012, p. 258, fig. 196. There is a sitara dated earlier, about 1880, that was auctioned in 2003 at Bonhams London (lot 105). This sitara was described as a Bab al-Tawba curtain similar to one auctioned at Christie’s London in 1999 (lot 21), which was also labeled as having hung on the Bab al-Tawba. Both the Bonhams and Christie’s catalogue descriptions cite a sitara in the collection of the Tareq Rajab Museum in Kuwait that is dated to the nineteenth century but not designated as a Bab al-Tawba curtain; see Safwat 1997, pp. 114–15. Although these three curtains and the Madina sitara are from the period of Sultan ‘Abd al-Hamid II, the three differ from the Madina sitara iconographically and in choice of Qur’anic text. These three curtains are also significantly smaller in size than the Madina sitara, which indicates that further research needs to be conducted to confirm whether they were produced to drape the Bab al-Tawba or were intended to hang elsewhere.

6 Jali thuluth script originated with Ibn al-Bawwab (d. 1031), the celebrated medieval calligrapher from Baghdad; Khalili 2006, p. 43.


8 Stillman and Sanders 2000, p. 536.


10 See, for example, the covers for the Shrine of the Prophet Ibrahim (Christie’s London 2005, lot 49, and Sotheby’s London 2007, lot 41); and the curtain for the tomb of the Prophet Muhammad in Medina (Sotheby’s London 2007, lot 40). For other K’b’a textiles from the Hamidian period, see Bonhams London 2003, lot 105; Christie’s London 1999, lot 21; and Safwat 1997, pp. 114–15.


12 For the sitara in the Khalili Collection, see ibid., p. 258; for the one in the Topkapi Palace Museum, see Tezcan 1996, pp. 64–65; for the curtain made between 1892 and 1909, see Christie’s London 2005, lot 48; and for the one dated by Sotheby’s as A.H. [1]321/1903–4, see Sotheby’s London 2007, lot 42. Three other sitaras, the present locations of which are unknown, are recorded in publications; see Rif’at 1925, vol. 1, p. 264, ill.; Ahmad 1937, p. 81, ill.; and Gouda 1989, p. 264, ill.


14 Qur’an 2:255, translation Ali (1934) 1946, vol. 1, pp. 102–3: “God! There is no god but He,—the Living, the Self-subsisting, Eternal. No slumber can seize Him nor sleep. His are all things in the heavens and on earth. Who is there [who] can intercede in His presence except as He permitteth? He knoweth what (appeareth to His creatures as) Before or After or Behind them.

Nor shall they compass aught of His knowledge except as He willeth. His Throne doth extend over the heavens and the earth, and He feeleth no fatigue in guarding and preserving them. For He is the Most High, the Supreme (in glory).”

15 See, for example, the burqu’ auctioned at Christie’s London 2005, lot 46.

16 İpek 2011, pp. 59–60.


19 The Warshat al-Khurunfish is also known by the name Dar al-Kiswah al-Sharifa, which it received in 1953 and retained until its closing in 1962. In 2011 the Nasser D. Khalili Collection of Islamic Art acquired an important collection of hajj artifacts, including archival material from the Cairo workshop. This collection consists of many objects that shed light on the production process, including photographs of artisans at work, documents, embroidery templates, tools, and raw materials. Yael Rosenfield traveled to London to research sitara-related objects in the Khalili Collection and arranged for permission to publish their photographs, and this author would like to thank her for her contribution to this section.

20 Nassar 2013, pp. 175–83.

21 Ibid., p. 176.

22 Quaetaert 1994, p. 87.

23 Quaetaert 1993, pp. 30, 32; Quaetaert 1994, pp. 87–88, 100.


25 Nassar 2013, p. 176.

26 Quaetaert 1993, p. 29; Quaetaert 1994, pp. 87–88, 100.


28 The orange silk thread showed extensive signs of deterioration, causing the silver-gilt wire to come loose from the background.

29 The double back stitch, also known as the crossed back stitch, is used mainly for shadow-work embroidery; see Thomas 1989, p. 47. A similar technique can be found in Indian metal embroidery; see Morrell 1994, p. 104, fig. 92, sample i.

30 In this warp-faced satin weave, the cotton wefts are concealed by the silk warps; the fabric thus appears shiny and silk-like. According to Irene Emery (1966, p. 108), satin weave is one of the three basic weave structures (plain, twill, and satin). It is a simple float weave structure, with long floats in one set of elements, in this case the warps. In addition to this weave structure, satin also denotes a smooth lustrous fabric. The black silk ground fabric is also a satin weave.

31 For this couching, we used the thread Gutermann Skala 100% Polyester, 5000 m., which was strong and blended well with the ground fabric.


33 Cristina Carr, conservator in the Department of Textile Conservation of the Metropolitan Museum, conducted the X-radiography.

34 O’Connor and Brooks 2007, p. 278.

35 Marina Ruiz Molina, associate conservator in the Department of Paper Conservation of the Metropolitan Museum, performed reflected infrared photography and shared her expertise with the process.

36 Thompson and Halliwell 2005.
Imaging and surface analysis of the wires and the sequin were realized in variable pressure mode at 20kV and 40 Pa, using a FE-SEM Zeiss Sigma HD, equipped with an Oxford Instrument X-MaxN 80 SDD detector.

Wires were sectioned both orthogonally and tangentially to the axis. After mechanical polishing with Micro-Mesh™ and Buehler® MicroCloth down to 0.5 μm, samples were milled with a Hitachi IM400 argon gun, ion mill system, and coated with 12 nm carbon. SEM-EDS analysis was realized in high vacuum mode at 20kV, WDS with an Oxford Instrument Inca Wave spectrometer at 30kV, and EBSD with a Nordlys Nano detector at 20kV. EBSD data were processed with Oxford Instrument Aztec software.

FTIR was performed by Caterina Cappuccini and Adriana Rizzo, using a Hyperion 3000 Microscope interfaced to a Tensor 27 (Bruker Optics), equipped with a 15x FTIR objective and a MCT detector (mercury cadmium telluride), liquid nitrogen cooled. The FTIR spectra were acquired as 64 scans in the range of 4000 to 600 cm⁻¹ and 4 cm⁻¹ resolution.

EDS analysis identified the presence of bromine, while HPLC analysis identified eosin Y, an organic colorant having bromine in its structure.

Small yarn samples were taken from the textile, extracted with a mixture of 0.01 M aqueous oxalic acid, pyridine, and methanol (3/3/4, v/v/v) assisted with heat; the extract was dried in a vacuum desiccator. The residue was dissolved in a mixture of methanol and 1% aqueous formic acid (1/1, v/v). The solution was centrifuged; the supernatant was injected into the HPLC system. The analytical system used consisted of a 1525 binary HPLC pump, 2996 PDA detector, 1500 series column heater, in-line degasser, and a Rheodyne 7725i manual injector with 20 μl loop (Waters Corporation, Milford, Mass.). An Xterra RP18 (3.5 μm-particle, 2.1 mm i.d. x 150.0 mm) reversed-phase column was used with a guard column (Xterra RP18 3.5 μm-particle, 2.0 mm i.d. x 10.0 mm) (Waters Corporation, Milford) with a flow rate of 0.2 ml/min. The column pre-filter (Upchurch Ultra-Low Volume Precolumn Filter with 0.5 μm stainless steel frit, Sigma-Aldrich, Saint Louis, Mo.) was attached in front of the guard column.

The gilded wires were drawn from almost pure silver. One wire is 99.89% silver and 0.13% copper, while the other two, one of which is the hidden wire, are approximately 99.89% silver and 0.11% lead, with traces of copper below 0.02%. Discrete inclusions of lead with traces of gold and the mineral altaite, a lead telluride, were identified by EDS and EBSD in the latter two wires.

Although there were a few color components detected but not identified, they are also likely color components of early synthetic dyes because the UV-visible absorption spectra of the unknown color components were similar to those of the identified components of synthetic dyes. Also, those components do not match any known natural dyes. The Colour Index is a reference database of dyes and pigments, and it lists colorants using dual classification, Colour Index Generic Name and Colour Index Constitution Numbers. The Colour Index (1971, vol. 1, pp. 1001, 1607) states that basic dyes are dyes that in aqueous solution yield colored cations and that acid dyes are water-soluble anionic dyes that are applied to nitrogenous fibers such as wool, silk, nylon, and modified acrylic fibers from acid or neutral baths.

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Although there were a few color components detected but not identified, they are also likely color components of early synthetic dyes because the UV-visible absorption spectra of the unknown color components were similar to those of the identified components of synthetic dyes. Also, those components do not match any known natural dyes. The Colour Index is a reference database of dyes and pigments, and it lists colorants using dual classification, Colour Index Generic Name and Colour Index Constitution Numbers. The Colour Index (1971, vol. 1, pp. 1001, 1607) states that basic dyes are dyes that in aqueous solution yield colored cations and that acid dyes are water-soluble anionic dyes that are applied to nitrogenous fibers such as wool, silk, nylon, and modified acrylic fibers from acid or neutral baths.

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challenging to interpret such findings and exclude unintentional contamination by the manufacturing process or airborne particulates or from manipulation of the textile before it entered the Museum's collection. In a few cases, material intentionally added to the surface of the threads was recognized, such as abundant barite (Ba, S) found in small, dispersed particles on the white weft lining and on the sewing thread; a kaolinitic clay (Al, Si) was found on the sewing thread, together with barite. Often, corrosion products of the metal wires have been found on both warp and weft threads, as well as on the sewing thread, in the form of silver chlorides and sulfides associated with traces of gold.

64 Knecht, Rawson, and Loewenthal 1893, vol. 1, p. 176. While cotton shows little power to retain dyes, cotton attracts tannins from aqueous solutions to form insoluble compounds with dyes.


66 Colour Index 1971, vol. 1, pp. 1004, 1017, 1075, 1153, 1607, 1611, 1633, 1649, 1680; Barnett 2007, p. 70. Some metal salts were also spoken of as having been used with tannins in order to improve wash fastness of early synthetic dyes, both on silk and cotton, from the end of the nineteenth century. Those metals were mainly antimony for light shades, and iron or tin for dark and dull shades; Scharff 1999, p. 657; Steelman 1922, p. 662; Matos 1915, p. 42; Knecht, Rawson, and Loewenthal 1893, vol. 2, p. 452. However, those metal elements typically used for light shades, the colors of the colored cartouches, were not detected by SEM-EDS analysis.


68 Barnett 2007, p. 74.


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